

Anritsu

Site Master S810C and S820C Microwave Transmission Line and Antenna Analyzer

Programming Manual



**Hand-Held Microwave Analyzer for Antennas,
Transmission Lines and Microwave Components**

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Programming Overview

NOTE: This programming manual is written exclusively for the Anritsu Site Master S8X0C Series. The Anritsu Site Master S8X0C Serial Port Commands are not backward compatible with the Site Master S8X0A Series. For information on firmware upgrades, contact your local Anritsu Service Center.

General Description

The Site Master must first be set into remote mode for communication with a computer. Remote mode differs from normal repetitive sweep and single-sweep modes. During remote mode, the Site Master stops sweeping entirely and attends to the serial port. The Site Master indicates remote mode by displaying the word REMOTE on the front panel display.

Once in remote mode, control bytes and associated data can be sent to the Site Master to command the unit to perform various functions and activities. The Site Master responds with data or feedback as necessary. Remote mode supports all features accessible from the keypad except the printer, which requires connection to the same 9-pin connector on the Site Master connector panel.

Remote mode can be exited by pressing the **ESCAPE/CLEAR** front panel key or by sending the Exit Remote control byte #255 (FFh) command. When the remote session is terminated, the Site Master resumes normal operation in the same sweep mode it was in before entering remote mode.

Interface Cable Installation

The Site Master is a DTE-type serial device. Communication between the Site Master and a PC is accomplished over a null modem serial cable provided with the Site Master (Anritsu part number 800-441). Connect the cable to the Serial Interface connector on the Site Master Test Connector Panel and to the appropriate COM port connector on the PC.

Serial Communication Parameters

The Site Master begins communication at 9600 bps when first powered on. It uses no parity bits, 8 data bits, and 1 stop bit (N-8-1). No hardware handshaking is used. The Set Baud Rate Control Byte #197 (C5h) serial command can be used to change the baud rate to 19,200, 38,400, 56,000 or 115,200. An invalid setting returns the rate to 9600.

Communications Error Checking

Since there is no hardware handshaking, byte level error handling must be done by the controlling program. The expected number of response bytes for each control byte (listed in the control byte description section of this manual) works well for responses coming from the Site Master. For data streams going to the Site Master, the "watch dog timer" protects against interrupted transmissions by aborting a control byte sequence if the inter-byte time limit is exceeded.

Parameter Validation

The Site Master validates input parameters for each control byte sequence. If the input parameters are out of range or invalid, the Site Master notifies the computer by sending Parameter Error Byte #224 (E0h). The Site Master discards the received data and waits for the next control byte.

Entering Remote Mode

Send the Enter Remote Mode Byte #69 (45h) to the Site Master to enter remote mode at the end of the current sweep. Send the Enter Remote Mode Immediately byte #70 (46h) to enter remote mode in the middle of a sweep.

The Site Master serial port buffer is one byte wide. No internal buffer exists, so waiting for the response from the unit is essential. If the Site Master is not in remote mode, sending a second byte overwrites the original byte commanding it to enter remote mode. If control byte #69 is sent, the Site Master will enter remote mode at the end of the current sweep. If control byte #70 is sent, the unit will enter remote mode as soon as it receives the byte. This means that data stored for the current sweep may be incomplete. Once a response string is received from the Site Master, the unit is ready to accept additional control bytes.

Exiting Remote Mode

To exit remote mode, send the Exit Remote Control byte #255 (0xFF) to the Site Master. The Site Master sends a response byte of 255 (0xFF) then exits remote mode. Remote mode can also be exited by pressing the **ESCAPE/CLEAR** front panel key.

Lifetime of Changes to Site Master Operating Parameters

System parameters changed during remote mode remain changed for normal operation after the unit exits remote mode. However, the changes are not automatically written to the non-volatile EEPROM. Turning off the Site Master power erases the changed settings.

To retain the changes, the setup must be saved to one of the setup memory locations. Use either the run-time setup location 0, (which holds the power-on defaults) or one of the nine other setup locations. Control byte #64 (40h) sets the auto-save flag which commands the Site Master to automatically save the changes to the run-time setup location upon exiting remote mode. Refer to the Site Master User's Guide or information in this manual on control byte #18 (12h) for further details.

Write Cycle Limitation of EEPROM

The EEPROM, used to store calibrations, setups and traces has a guaranteed lifetime of at least 100,000 write cycles and an unlimited number of read cycles. The write cycle limitation is for a specific location. For example, setup #1 can be stored 100,000 times and setup #2 can be stored 100,000 times, etc. Because of this, the Site Master does not automatically store the changed system parameters to the EEPROM. Be aware of the EEPROM write cycle limitation when programming the Site Master and keep the number of write cycles to a minimum.

Documentation Conventions

Throughout the rest of the documentation, the following conventions will be observed:

Numeric Representation

Hexadecimal numbers will be represented with the suffix h. For example, the decimal number 255 will be represented in hexadecimal as FFh.

Binary numbers will be represented with the suffix "b." For example, the decimal number 2 will be represented in binary as 10b.

Decimal numbers will be represented with the prefix "#" when referring to a control byte (command byte) and without prefix or suffix in all other cases.

Bit Positions

When enumerating bits in a byte, bit 0 will always be the least significant bit (LSB).

Control Byte Descriptions

Setup System - Control Byte #1 (01h)

Description: Sets system status flags and switches. The Site Master acts on the entire byte. You must account for the state of each of the bits. For example, if you wanted to turn the LCD back light on without disturbing the other switches you would do the following: query the Site Master with control byte #20. You would mask in the LCD status (04h) with the data from response bytes # 136 and #138 and send this to the Site Master after control byte #1.

See control byte #20 (14h) response bytes 136 and 138 for current Site Master configuration. It is important to set the Metric/English flag to the proper value before sending distance information.

Bytes to Follow: 1 byte

- 1) Status Byte (1b = On, 0b = Off)
(LSB) bit 0 = Fixed CW Mode On/Off
bit 1 = Not Used
bit 2 = LCD Back Light On/Off
bit 3 = Measurement Unit Metric/English (0b = English, 1b = Metric)
bit 4 = Cal On/Off
bit 5-7: Not Used

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid setting
238 (EEh) Time-out Error

Notes:

1. Cal can be turned on only if a complete calibration has been performed at the current start and stop frequencies. Otherwise, 244 (E0h) will be returned.
-

Set Site Master Frequency - Control Byte #2 (02h)

Description: Sets the Site Master frequency range.

See control byte #20 (14h) response bytes 4 to 11 for current Site Master configuration.

Bytes to Follow: 8 bytes

- 1) Start Frequency (highest byte)
- 2) Start Frequency
- 3) Start Frequency
- 4) Start Frequency (lowest byte)
- 5) Stop Frequency (highest byte)
- 6) Stop Frequency
- 7) Stop Frequency
- 8) Stop Frequency (lowest byte)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid frequency range
238 (EEh) Time-out Error

Notes:

1. Start and stop frequencies are given in terms of 1 KHz steps. (e.g., 5.3 GHz would be sent as 5300000 = 5300000 KHz)

Select Measurement Mode - Control Byte #3 (03h)

Description: Sets measurement domain and display graph type. You must have a valid calibration (current frequencies and calibration frequencies being the same) to switch to the Distance domain.

See control byte #20 (14h) response byte 1 for current Site Master mode.

Bytes to Follow: 1 byte

- 1) Measurement Mode
 - 00h: RL Frequency
 - 01h: SWR Frequency
 - 02h: Cable Loss Frequency
 - 10h: RL Distance
 - 11h: SWR Distance
 - 40h: Power Monitor
 - 74h: Fast Tune RL
 - 75h: Fast Tune SWR

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid Measurement Mode
238 (EEh) Time-out Error

Set Site Master Scale - Control Byte #4 (04h)

Description: Sets the graph boundaries.

The scale settings require knowing the graph type for proper configuration. For example, the scale start in return loss is the top of the graph while scale start is the bottom of the graph for SWR. Think of the scale start as being the smallest value on the graph.

See control byte #20 (14h) response bytes 12 to 19 for current Site Master scaling. For Data formats' see Note below.

Bytes to Follow: 8 bytes

- 1) Scale Start Value (highest byte)
- 2) Scale Start Value
- 3) Scale Start Value
- 4) Scale Start Value (lowest byte)
- 5) Scale Stop Value (highest byte)
- 6) Scale Stop Value
- 7) Scale Stop Value
- 8) Scale Stop Value (lowest byte)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid scale range
238 (EEh) Time-out Error

Notes:

1. Return Loss & Cable Loss
 - Scaling is in thousandths of a dB
 - Maximum value sent is 54000 which represents 54.00 dB
 - Minimum value sent is 0 which represent 0.00 dB

Scale Start Value is the top of the graph
Scale Stop Value is the bottom of the graph

2. SWR: Scaling is in thousandths (of ratio)
Maximum value sent is 65535 which represents 65.53
Minimum value sent is 1000 which represents 1.00
Scale Start Value is the bottom of the graph
Scale Stop Value is the top of the graph
-

Set Site Master Marker - Control Byte #5 (05h)

Description: Sets an individual marker status and location.

The Site Master sets the position of a marker by its relative position on the graph (i.e., the corresponding data point). The lowest position is 0 at the start frequency (or distance). The highest position is at the stop frequency (or distance). For example, if the resolution is 130 Data Points, the start frequency is at point 0 and the stop frequency is at point 129. To calculate the data point from a frequency (or distance) do the following:

$$\text{Point} = \frac{(\text{resolution} - 1) * (\text{marker frequency} - \text{start frequency})}{(\text{stop frequency}) - (\text{start frequency})}$$

In order to set frequency markers, you must be in the frequency domain. Likewise, if you want to set distance markers, you must be in the distance domain. Marker position is independently remembered for distance and frequency domains.

See control byte #20 (14h) response bytes 20 to 31 for current frequency markers. See control byte #20 (14h) response bytes 114 to 125 for current distance markers. See control byte #20 (14h) response byte 134 for current marker on/off status and byte 135 for the marker delta status.

Bytes to Follow: 5 bytes

- 1) Marker Number (01h-06h: marker 1-6)
- 2) Marker Line On/Off (01h = On, 00h = Off)
- 3) Marker Delta On/Off (01h = On, 00h = Off)
- 4) Marker Value (higher byte)
- 5) Marker Value (lower byte)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid marker, marker status, or marker position
238 (EEh) Time-out Error

Notes:

1. Marker Delta is not applicable to Marker 5 and Marker 6.
-

Set Segmented Limit Lines - Control Byte #6 (06h)

Description: Sets the position and On/Off Status of the Limit Lines.

S8X0C supports 5 limit segments. Each segment may have any finite slope and can be enabled and disabled independently of every other segment. The limit beep is enabled for all segments or no segments.

Limit segments are specified by their end points (starting and ending “x” and “y” values).

See control byte #20 (14h) response byte 36 to 105 for current Site Master configuration.

Bytes to Follow: 14 bytes

- 1) Limit Number
- 2) Limit Line On/Off (01h = On, 00h = Off)
- 3) Starting X (highest byte)¹
- 4) Starting X
- 5) Starting X
- 6) Starting X (lowest byte)
- 7) Starting Y (highest byte)²
- 8) Starting Y (lowest byte)
- 9) Ending X (highest byte)¹
- 10) Ending X
- 11) Ending X
- 12) Ending X (lowest byte)
- 13) Ending Y (highest byte)²
- 14) Ending Y (lowest byte)

SM Returns: 255 (FFh) Operation Complete Byte
 224 (E0h) Parameter Error: Invalid limit segment, limit status, or limit value
 238 (EEh) Time-out Error

Notes:

1. Start and stop frequencies are given in terms of 1 KHz steps. (e.g., 5.3 GHz would be sent as 5300000 = 5300000 KHz.)
2. Limit Value depends on the current display mode selected.
 Return Loss & Cable Loss:
 Limit is in thousandths of a dB
 Maximum value sent is 54000 which represents 54.00 dB
 Minimum value sent is 0 which represents 0.0 dB

 SWR:
 Limit is in thousandths (of ratio)
 Maximum value sent is 65530 which represents 65.53
 Minimum value sent is 1000 which represents 1.00

Set DTF Parameter - Control Byte #7 (07h)

Description: Sets Distance to Fault parameters.

Be aware using this control byte. The distance to fault parameters are all inter-related. Consequently, the control byte must change all of those parameters at the same time to properly set them.

Please refer to the Site Master User's Guide for a detailed explanation of the factors influencing proper selection of DTF parameters.

See control byte #20 (14h) response bytes 106 to 113 and 126 to 133 for current Site Master configuration.

- Bytes to Follow:** 24 bytes:
- 1) Start Distance (highest byte)
 - 2) Start Distance
 - 3) Start Distance
 - 4) Start Distance (lowest byte)
 - 5) Stop Distance (highest byte)
 - 6) Stop Distance
 - 7) Stop Distance
 - 8) Stop Distance (lowest byte)

- 9) Relative Propagation Velocity (highest byte)
- 10) Relative Propagation Velocity
- 11) Relative Propagation Velocity
- 12) Relative Propagation Velocity (lowest byte)
- 13) Cable Loss (highest byte)
- 14) Cable Loss
- 15) Cable Loss
- 16) Cable Loss (lowest byte)
- 17) Waveguide Cutoff Frequency (highest byte)
- 18) Waveguide Cutoff Frequency
- 19) Waveguide Cutoff Frequency
- 20) Waveguide Cutoff Frequency (lowest byte)
- 21) Waveguide Loss (highest byte)
- 22) Waveguide Loss
- 23) Waveguide Loss
- 24) Waveguide Loss (lowest byte)

SM Returns: 255 (FFh) Operation Complete Byte
 224 (E0h) Parameter Error: Parameter(s) out of range
 238 (EEh) Time-out Error

Notes:

1. Give Start & Stop Distances in hundred-thousandths of meter or foot (12.34 m would be sent as 1234000).
2. Relative Propagation Velocity is in hundred-thousandths (a Relative Propagation Velocity of 0.850 will be sent as 85000).
3. Cable Loss is in hundred-thousandths of dB/m or dB/ft (-0.345 dB/m would be sent as 34500).
4. WAVEGUIDE Cutoff Frequency is in KHz (5.3 KHz would be sent as 5300000).
5. Waveguide Loss is in hundred-thousandths of dB/m or dB/ft (-0.345 dB/m would be sent as 34500).

Set Time/Date - Control Byte #8 (08h)

Description: Sets the current time and date.

Bytes to Follow: 7 bytes

- 1) Hour: 0-23
- 2) Minute: 0-59
- 3) Month: 1-12
- 4) Day: 1-31
- 5) Year (higher Byte): Treat the two bytes as an integer. E.g. 07h, D1h stands for
- 6) Year (lower Byte) 2001
- 7) Daylight Saving (ON/OFF): 0 or 1

SM Returns: 255 (FFh) Operation Complete Byte
 238 (EEh) Time-out Error

Set Reference Number - Control Byte #9 (09h)

Description: The reference number is also known as the trace name. It is the combination of 16 letters, numbers, spaces and the characters “-“, “,“, “.“, and “/“. The command saves the trace name to be used with the next trace. The current reference number is found by recalling trace 0 and examining response bytes 39-54.

Bytes to Follow: 16 bytes (ASCII text string)

SM Returns: 255 (FFh) Operation Complete Byte
238 (EEh) Time-out Error

Serial Port Echo On/Off - Control Byte #10 (0Ah)

Description: Sets the serial port echo mode On/Off.

Serial Port Echo Mode uses the single sweep mode (see control byte #11 (0Bh)). Therefore, at the end of each sweep cycle, the Site Master sends a Sweep Complete Byte #192 (C0h) to the serial port.

This mode activates once the Site Master exits from the remote mode. Serial Port Echo status can't be saved to/or recalled from saved setups. Cycling power resets the Serial port echo status to Off.

The Serial Port Echo Mode allows run-time handshaking between the Site Master and computer by doing the following:

- 1) Enter remote mode. Set Serial Port Echo Mode On. Exit remote mode.
- 2) The Site Master sweeps once and then sends the Sweep Complete Byte.
- 3) After you receive it. Enter remote mode. Recall sweep 0 (last sweep trace in RAM).
- 4) Exit remote mode. Send Sweep Trig. Byte #48 (30h) and wait for the next sweep cycle.
- 5) Repeat steps 2-4

Bytes to Follow: 1 byte
1) Serial Port Echo Status
00h = Off
01h = On

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid serial port echo status
238 (EEh) Time-out Error

Single Sweep Mode On/Off - Control Byte #11 (0Bh)

Description: Enables or disables the Single Sweep Mode. Single Sweep Mode activates once the Site Master exits from the remote mode.

When the Site Master returns to local mode, the Site Master stops sweeping, waits for either the RUN/HOLD KEY of the Site Master keypad or triggering byte #48 (30h).

Site Master also checks for remote control byte #69 (45h) at the end of each sweep. If present in the buffer, Site Master returns to remote mode (no sweeping, locked keypad).

Bytes to Follow: 1 byte
1) Single Sweep Mode Status
00h = Off
01h = On

SM Returns:

1. 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid single sweep mode status
238 (EEh) Time-out Error
-

Watch-dog Timer On/Off - Control Byte #12 (0Ch)

Description: Enables or Disables the Watch-dog timer.

The Site Master incorporates a Watch-dog Timer for higher reliability in serial communication. In selected control bytes (see control byte summary), the Site Master checks for the time interval between each byte received from the computer. If the time interval exceeds the set time limit (0.5 sec), the Site Master notifies the computer by sending Time-out Byte #238 (EEh). The Site Master discards the data it just received and then waits for the next control byte sequence.

This setting cannot be saved or recalled from a setup. It must be reset after the unit is power-cycled. The default value is Off.

Bytes to Follow: 1 byte
1) Watch-dog timer On/Off
00h = Off
01h = On

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid watch-dog timer status

Sequence Site Master Calibration – Control Byte #13 (0Dh)

Description: Initiates a calibration step.

The Site Master must be calibrated to give accurate measurements. Calibration is based on frequency range. Once the frequency range is set, sequence the calibration process using this control byte. Measure each component (open, short, load) then trigger the Calculate step. The Calculate step uses the measurements obtained and generates the correction factors.

Upon receiving this control byte any old calibration data is lost. The media type is determined by the second byte. The Site Master does the calibration step specified by the third byte. After the measurements, you must trigger the Calculate step to complete the calibration. **Do not exit remote mode until the calculation is complete.**

Note that the measured trace of each step is not display on the Site Master screen.

After receiving the Calculate byte, the Site Master checks to see if all calibration steps are completed. The Site Master calculates the resulting correction factors and sends an Operation Complete Byte #255 (FFh) to the computer. If all four steps are not complete, the Site Master returns an Operation Incomplete Byte #224 (E0h) and no calculation is performed.

Bytes to Follow: 2 bytes
1) Media to calibrate for
00h = Coax
01h = Waveguide
2) Calibration Step to trigger
01h = open / 1/8th Short

02h = short / 3/8th Short
03h = load
06h = Calculate Calibration Data

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Error: Invalid Cal operation or Cal Incomplete
238 (EEh) Time-out Error

Set Site Master Data Points – Control Byte #14 (0Eh)

Description: Set number of measurement data points for Site Master.
See control byte #20 (14h) response bytes 2 and 3 for the current configuration.

Bytes to Follow: 1 bytes

- 1) Not valid in Fast Tune Mode
00h = 130 Points
01h = 259 Points
02h = 517 Points

Valid only in Fast Tune Mode
03h = 65 Points
04h = 43 Points
05h = 33 Points

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid Data Point Setting for given mode
238 (EEh) Time-out Error

Set Site Master Limit Beep Status — Control Byte #15 (0Fh)

Description: Enable or disable the limit beep for all limit segments.

Bytes to Follow: 1 byte

- 1) Status (00h = OFF 01h = ON)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid status value
238 (EEh) Time-out Error

Store Sweep Trace – Control Byte #16 (10h)

Description: Saves current trace to the next available memory location.

Note: Any calibration steps performed in remote mode overwrite the trace data in the memory.

Bytes to Follow: 0 bytes

SM Returns: 5 bytes

- 1-4) Time/Date Stamp (in long integer format, seconds since Jan. 1, 1970)
- 5) Operation result: 255 (FFh) Operation Complete Byte
224 (E0h) Out of memory (Memory full)
238 (EEh) Time-out Error

Recall Sweep Trace – Control Byte #17 (11h)

Description: Queries the Site Master for sweep trace data.

Bytes to Follow: 1 Byte

- 0 - Last sweep trace before entering remote mode (sweep trace in RAM)
- 1- 200 = Specific saved sweep number (stored sweeps in Flash memory)

SM Returns:

- 1-2) # of following bytes
- 3-4) Model ID (0Eh for the S810C and 0Fh for the S820C)
- 5-11) Model Number (7 bytes in ASCII)
- 12-15) Software Version (4 bytes ASCII)
- 16) Measurement Mode¹
- 17-20) Time/Date(in Long Integer)
- 21-30) Date in String Format(mm/dd/yyyy)
- 31-38) Time in String Format(hh:mm:ss)
- 39-54) Reference Number Stamp (16 bytes in ASCII)
- 55-56) # data points
- 57) Start Frequency (in KHz) (highest byte)
- 58) Start Frequency
- 59) Start Frequency
- 60) Start Frequency (in KHz) (lowest byte)
- 61) Stop Frequency (highest byte)
- 62) Stop Frequency
- 63) Stop Frequency
- 64) Stop Frequency (lowest byte)
- 65) Minimum Frequency Step Size (in KHz) (highest byte)
- 66) Minimum Frequency Step Size
- 67) Minimum Frequency Step Size
- 68) Minimum Frequency Step Size (in KHz) (lowest byte)
- 68) Scale Top (highest byte) ²
- 70) Scale Top
- 71) Scale Top
- 72) Scale Top (lowest byte)
- 73) Scale Bottom (higher byte) ²
- 74) Scale Bottom
- 75) Scale Bottom
- 76) Scale Bottom (lowest byte)
- 77) Frequency Marker 1 (higher byte)³
- 78) Frequency Marker 1 (lower byte)
- 79) Frequency Marker 2 (higher byte) ³
- 80) Frequency Marker 2 (lower byte)
- 81) Frequency Marker 3 (higher byte) ³
- 82) Frequency Marker 3 (lower byte)
- 83) Frequency Marker 4 (higher byte) ³
- 84) Frequency Marker 4 (lower byte)
- 85) Frequency Marker 5 (higher byte) ³
- 86) Frequency Marker 5 (lower byte)
- 87) Frequency Marker 6 (higher byte) ³
- 88) Frequency Marker 6 (lower byte)
- 89) Single Limit Line Value (highest byte) ²
- 90) Single Limit Line Value
- 91) Single Limit Line Value
- 92) Single Limit Line Value (lowest byte)
- 93) Multiple Limit Segment # (1)
- 94) Multiple Limit Segment Status (01h = On, 00h = Off)

- 95) Multiple Limit Segment Start X (in KHz)(highest byte)
- 96) Multiple Limit Segment Start X
- 97) Multiple Limit Segment Start X
- 98) Multiple Limit Segment Start X (lowest byte)
- 99) Multiple Limit Segment Start Y (higher byte) ²
- 100) Multiple Limit Segment Start Y (lower byte)
- 101) Multiple Limit Segment End X (in KHz)(highest byte)
- 102) Multiple Limit Segment End X
- 103) Multiple Limit Segment End X
- 104) Multiple Limit Segment End X (lowest byte)
- 105) Multiple Limit Segment End Y (higher byte) ²
- 106) Multiple Limit Segment End Y (lower byte)
- 107–162) Repeat bytes 93-106 for segments 2-5
- 163) Start Distance (highest byte)⁴
- 164) Start Distance
- 165) Start Distance
- 166) Start Distance (lowest byte)
- 167) Stop Distance (highest byte) ⁴
- 168) Stop Distance
- 169) Stop Distance
- 170) Stop Distance (lowest byte)
- 171) Distance Marker 1 (higher byte)⁵
- 172) Distance Marker 1 (lower byte)
- 173) Distance Marker 2 (higher byte) ⁵
- 174) Distance Marker 2 (lower byte)
- 175) Distance Marker 3 (higher byte) ⁵
- 176) Distance Marker 3 (lower byte)
- 177) Distance Marker 4 (higher byte) ⁵
- 178) Distance Marker 4 (lower byte)
- 179) Distance Marker 5 (higher byte) ⁵
- 180) Distance Marker 5 (lower byte)
- 181) Distance Marker 6 (higher byte) ⁵
- 182) Distance Marker 6 (lower byte)
- 183) Relative Propagation Velocity (highest byte) ⁶
- 184) Relative Propagation Velocity
- 185) Relative Propagation Velocity
- 186) Relative Propagation Velocity (lowest byte)
- 187) Cable Loss (highest byte) ⁷
- 188) Cable Loss
- 189) Cable Loss
- 190) Cable Loss (lowest byte)
- 191) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0: Marker 1 On/Off
 - bit 1: Marker 2 On/Off
 - bit 2: Marker 3 On/Off
 - bit 3: Marker 4 On/Off
 - bit 4: Marker 5 On/Off
 - bit 5: Marker 6 On/Off
 - bits 6-7: Not Used
- 192) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0: Marker 2 Delta On/Off
 - bit 1: Marker 3 Delta On/Off

- bit 2: Marker 4 Delta On/Off
- bit 3-7: Not Used
- 193) Status Byte 3: (0b = Off , 1b = On)
 - (LSB) bit 0: single limit line On/Off
 - bit 1: CW mode On/Off
 - bit 2: Not Used
 - bit 3: Not Used
 - bit 4: Media (0=COAX, 1=WAVEGUIDE)
 - bit 5: Cal On/Off
 - bit 6: Limit Type (0 = Single; 1 = Multiple)
 - bit 7: Unit of Measurement (1 = Metric, 0 = English)
- 194) Status Byte 4:
 - (LSB) bit 0 - 1: DTF Windowing Mode
 - bit: 1 0
 - | |
 - 0 0 - Rectangular (No Windowing)
 - 0 1 - Nominal Side Lobe
 - 1 0 - Low Side Lobe
 - 1 1 - Minimum Side Lobe
 - bit 2 - 7: Not Used
- 195) Waveguide Loss (highest byte) 7
- 196) Waveguide Loss
- 197) Waveguide Loss
- 198) Waveguide Loss (lowest byte)
- 199) Waveguide Cutoff Freq (in KHz)(highest byte)
- 200) Waveguide Cutoff Freq
- 201) Waveguide Cutoff Freq
- 202) Waveguide Cutoff Freq (lowest byte)
- 203-228) Not Used (26 bytes)
- 229-492) Sweep Data (33 points * 8 bytes/point=264bytes)
- 229-572) Sweep Data (43 points * 8 bytes/point=344 bytes)
- 229-748) Sweep Data (65 points * 8 bytes/point=520 bytes)
- 229-1268) Sweep Data (130 points * 8 bytes/point=1040 bytes)
- 229-2300) Sweep Data (259 points * 8 bytes/point= 2072 bytes)
- 229-4364) Sweep Data (517 points * 8 bytes/point= 4136 bytes)

8 bytes for each data point

1. Gamma MSB
2. Gamma
3. Gamma
4. Gamma LSB
5. Phase MSB
6. Phase
7. Phase
8. Phase LSB

For invalid sweeps (empty stored sweep locations): 11 bytes.

1-2) Number of Following Bytes (9 bytes for invalid sweep recall)

3-4) Model # (unsigned integer, 0Eh for the S810C and 0Fh for the S820C)

5-11) Extended Model # (7 bytes in ASCII)

Invalid sweep location: 1 byte

224 (E0): Parameter error: Invalid sweep location

Notes:

return loss/INC_REF = $-20000 * \log(\text{Gamma}/1000)$
 VSWR = $(1+\text{Gamma})/(1-\text{Gamma})$
 Incident = $\text{Gamma}[\text{Real}]$
 Reflected = $\text{Gamma}[\text{Real}]$
 Phase compares the reflected to the incident (reference)
 Gamma is in thousandths (of ratio)
 Phase is in tenths of degree

1. 00h: RL Frequency
 01h: SWR Frequency
 02h: Cable Loss Frequency
 10h: RL Distance
 11h: SWR Distance
 40h: Power Monitor
 74h: Fast Tune RL
 75h: Fast Tune SWR
2. "value" sent as (value * 1,000)
3. Display/Data Point
 To convert from "point" to frequency:
 $((\text{stop frequency} - \text{start frequency}) / (\#\text{data points}-1)) * \text{point} + \text{start frequency}$
 where start frequency is stored in bytes 57-60, stop frequency is stored in 61-64 and #data points is stored in bytes 55-56
4. Distance data uses units 1/100,000m (or feet)
5. Display/ Data Point
 To convert from "point" to distance:
 $((\text{stop distance} - \text{start distance}) / (\#\text{data points}-1)) * \text{point} + \text{start distance}$
 where start frequency is stored in bytes 163-166, stop frequency is stored in 167-170 and #data points is stored in bytes 55-56
6. Relative Propagation Velocity uses units 1/100,000
7. Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

Save System Setup - Control Byte #18 (12h)

Description: Saves current system setup parameters to a specific setup store location.

The Site Master saves all parameters described in System Status Query - Control Byte #20 (14h)(except Serial Port Echo Status) to the specified store location. Store location 0 is the run-time setup of the Site Master. It holds the power-on defaults of the Site Master.

Bytes to Follow: 1 byte
 1) Location to save system setup parameters, 0 - 10

SM Returns: 255 (FFh) Operation Complete Byte
 224 (E0h) Parameter Error: Invalid store location
 238 (EEh) Time-out Error

Recall System Setup - Control Byte #19 (13h)

Description: Recalls system setup parameters from a specific store location.

The Site Master recalls all parameters described in System Status Query (14h) (except Serial Port Echo Status) from the specified store location. The recalled setup does not automatically become the default setup when exiting remote.

You may want to save the recalled setup as the run-time setup by saving it to setup location 0 (which holds the power-on defaults). See control byte #18 (12h) for details.

Bytes to Follow: 1 byte

- 1) Location from which to recall system setup parameters:
 - 0 = Run time setup
 - 1 – 10 = Saved setups
 - 255 = Default setup

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid store location or no saved setup
238 (EEh) Time-out Error

Query System Status - Control Byte #20 (14h)

Description: Queries the Site Master for current system settings.

The current state of the Site Master represents the state after last successful remote control operation. For example, change the start frequency to another valid frequency while in remote mode, then execute control byte #20. The new start frequency will be returned in bytes 4-7, even though no sweep has been performed with that frequency.

Bytes to Follow: 0 bytes

SM Returns: 176 bytes

- 1) Measurement Mode¹
- 2) Site Master Mode Data Points (higher byte)
- 3) Site Master Mode Data Points (lower byte)
- 4) Start Frequency (in KHz)(highest byte)
- 5) Start Frequency
- 6) Start Frequency
- 7) Start Frequency (lowest byte)
- 8) Stop Frequency (in KHz) (highest byte)
- 9) Stop Frequency
- 10) Stop Frequency
- 11) Stop Frequency (lowest byte)
- 12) Scale Start (higher byte)²
- 13) Scale Start
- 14) Scale Start
- 15) Scale Start (lower byte)
- 16) Scale Stop (higher byte)²
- 17) Scale Stop
- 18) Scale Stop
- 19) Scale Stop (lower byte)
- 20) Frequency Marker 1 (higher byte)³
- 21) Frequency Marker 1(lower byte)

- 22) Frequency Marker 2 (higher byte) ³
- 23) Frequency Marker 2 (lower byte)
- 24) Frequency Marker 3 (higher byte) ³
- 25) Frequency Marker 3 (lower byte)
- 26) Frequency Marker 4 (higher byte) ³
- 27) Frequency Marker 4 (lower byte)
- 28) Frequency Marker 5 (higher byte) ³
- 29) Frequency Marker 5 (lower byte)
- 30) Frequency Marker 6 (higher byte) ³
- 31) Frequency Marker 6 (lower byte)
- 32) Single Limit Line Value (highest byte) ²
- 33) Single Limit Line Value
- 34) Single Limit Line Value
- 35) Single Limit Line Value (lowest byte)
- 36) Multiple Limit Segment # (1)
- 37) Multiple Limit Segment Status
- 38) Multiple Limit Segment Start X (in KHz)(highest byte)
- 39) Multiple Limit Segment Start X
- 40) Multiple Limit Segment Start X
- 41) Multiple Limit Segment Start X (lowest byte)²
- 42) Multiple Limit Segment Start Y (higher byte)
- 43) Multiple Limit Segment Start Y (lower byte)
- 44) Multiple Limit Segment End X (in KHz) (highest byte)
- 45) Multiple Limit Segment End X
- 46) Multiple Limit Segment End X
- 47) Multiple Limit Segment End X (lowest byte)
- 48) Multiple Limit Segment End Y (higher byte) ²
- 49) Multiple Limit Segment End Y (lower byte)
- 50-105) Repeat bytes 36-49 for segments 2-5
- 106) Start Distance (highest byte)⁴
- 107) Start Distance
- 108) Start Distance
- 109) Start Distance (lowest byte)
- 110) Stop Distance (highest byte) ⁴
- 111) Stop Distance
- 112) Stop Distance
- 113) Stop Distance (lowest byte)
- 114) Distance Marker 1 (higher byte) ⁵
- 115) Distance Marker 1 (lower byte)
- 116) Distance Marker 2 (higher byte) ⁵
- 117) Distance Marker 2 (lower byte)
- 118) Distance Marker 3 (higher byte) ⁵
- 119) Distance Marker 3 (lower byte)
- 120) Distance Marker 4 (higher byte) ⁵
- 121) Distance Marker 4 (lower byte)
- 122) Distance Marker 5 (higher byte) ⁵
- 123) Distance Marker 5 (lower byte)
- 124) Distance Marker 6 (higher byte) ⁵
- 125) Distance Marker 6 (lower byte)
- 126) Relative Propagation Velocity (highest byte) ⁶
- 127) Relative Propagation Velocity
- 128) Relative Propagation Velocity

- 129) Relative Propagation Velocity (lowest byte)
- 130) Cable Loss (highest byte) ⁷
- 131) Cable Loss
- 132) Cable Loss
- 133) Cable Loss (lowest byte)
- 134) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0: Site Master Marker 1 On/Off
 - bit 1: Site Master Marker 2 On/Off
 - bit 2: Site Master Marker 3 On/Off
 - bit 3: Site Master Marker 4 On/Off
 - bit 4: Site Master Marker 5 On/Off
 - bit 5: Site Master Marker 6 On/Off
 - bit 6 - 7: Not Used
- 135) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0: not used
 - bit 1: Site Master Marker 2 delta On/Off
 - bit 2: Site Master Marker 3 delta On/Off
 - bit 3: Site Master Marker 4 delta On/Off
 - bit 4-7: Not Used
- 136) Status Byte 3: (0b = Off , 1b = On)
 - (LSB) bit 0: Single Limit Status On/Off
 - bit 1-2: Not Used
 - bit 3: Media(0b=COAX, 1b=WAVEGUIDE)
 - bit 4: Site Master Cal On/Off
 - bit 6: Site Master Limit Beep On/Off
 - bit 7: Not Used
- 137) Status Byte 4:
 - (LSB) bit 0 - 1: DTF Windowing Mode
 - bit: 1 0
 - | |
 - 0 0 - Rectangular (No Windowing)
 - 0 1 - Nominal Side Lobe
 - 1 0 - Low Side Lobe
 - 1 1 - Minimum Side Lobe
 - bit 2 – 7: Not Used
- 138) Status Byte 5:
 - (LSB) bit 0: Fixed CW mode On/Off
 - bit 1: Currently Unused
 - bit 2: LCD Back Light On/Off
 - bit 3: Measurement Unit Metric/English (0b = English, 1b = Metric)
 - bit 4: High Power On/Off
 - bit 5: Bias Tee On/Off
 - bit 6 -7: Not Used
- 139) Serial Port Echo Status On/Off (1b=On, 0b=Off)
- 140) Printer Type (see control byte #30 for available printers)
- 141) Trace Overlay Status
- 142) Trace Overlay Trace Number
- 143) Cutoff Frequency (in KHz) (highest byte)
- 144) Cutoff Frequency
- 145) Cutoff Frequency
- 146) Cutoff Frequency (lowest byte)
- 147) Waveguide 1/8th Offset Length (highest byte)⁸

- 148) Waveguide 1/8th Offset Length
- 149) Waveguide 1/8th Offset Length
- 150) Waveguide 1/8th Offset Length (lowest byte)
- 151) Waveguide 3/8th Offset Length (highest byte) ⁸
- 152) Waveguide 3/8th Offset Length
- 153) Waveguide 3/8th Offset Length
- 154) Waveguide 3/8th Offset Length (lowest byte)
- 155) Waveguide Cutoff Frequency (in KHz) (highest byte)
- 156) Waveguide Cutoff Frequency
- 157) Waveguide Cutoff Frequency
- 158) Waveguide Cutoff Frequency (lowest byte)
- 159) Waveguide Loss (highest byte)
- 160) Waveguide Loss
- 161) Waveguide Loss
- 162) Waveguide Loss (lowest byte)
- 163) Coax connector type
- 164) LCD Contrast
- 165) RTC Voltage reading (highest byte)
- 166) RTC Voltage reading (lowest byte)
- 167) PCB Revision Number (highest byte)
- 168) PCB Revision Number (lowest byte)
- 169-176) Not Used

Notes:

1. 00h: RL Frequency
01h: SWR Frequency
02h: Cable Loss Frequency
10h: RL Distance
11h: SWR Distance
40h: Power Monitor
74h: Fast Tune RL
75h: Fast Tune SWR
2. "value" sent as (value * 1,000)
3. Display/Data Point
To convert from "point" to frequency:
$$(((\text{stop frequency} - \text{start frequency}) / (\#\text{data points}-1)) * \text{point}) + \text{start frequency}$$
where start frequency is stored in bytes 57-60, stop frequency is stored in 61-64 and #data points is stored in bytes 55-56
4. Distance data uses units 1/100,000m (or feet)
5. Display/ Data Point
To convert from "point" to distance:
$$(((\text{stop distance} - \text{start distance}) / (\#\text{data points}-1)) * \text{point}) + \text{start distance}$$
where start frequency is stored in bytes 163-166, stop frequency is stored in 167-170 and #data points is stored in bytes 55-56
6. Relative Propagation Velocity uses units 1/100,000
7. Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.
8. Offset Length uses units 1/1000,000 mm

Trigger Self-Test - Control Byte #21 (15h)

- Description:** Triggers a self test on the Site Master.
- Bytes to Follow:** 0 bytes
- SM Returns:** 9 bytes
- 1) Self-test report: (0b = Fail, 1b = Pass)
(LSB) bit 0: Phase Lock Loop
bit 1: Integrator
bit 2: Battery
bit 3: Temperature
bit 4: EEPROM read/write
bit 5- 7: Not Used.
 - 2) Battery Voltage(higher byte)
 - 3) Battery Voltage(lower byte)
 - 4) Temperature (higher byte)
 - 5) Temperature (lower byte)
 - 6) Lock Fail Counter (higher byte)
 - 7) Lock Fail Counter (lower byte)
 - 8) Integrator Fail Counter (higher byte)
 - 9) Integrator Fail Counter (lower byte)

Notes:

1. Battery Voltage in 1/10th of a Volt (e.g., 124 = 12.4 Volts)
2. Temperature in 1/10th of degree Celsius (e.g., 362 = 36.2 °C) or degree Fahrenheit (e.g., 934 = 93.4 °F), depending on the current measurement unit (metric or English) selected.

Read Fail Counters - Control Byte #22 (16h)

Description: Reads the value of the Lock Fail Counter and Analog Integrator Fail Counter. This duplicates the functionality of the front panel icons. If the Analog Integrator takes too long to reach measurement level, due to low battery or an interfering signal, the count increments. If the Phase lock circuitry fails, its count increments. You check these counters at the end of the sweep to ensure a successful measurement.

The Site Master preserves the value of each counter when power is turned off.

- Bytes to Follow:** 0 byte
- SM Returns:** 4 bytes (unsigned integer)
- 1) Lock fail counter (high byte)
 - 2) Lock fail counter (low byte)
 - 3) Integrator fail counter (high byte)
 - 4) Integrator fail counter (low byte)

Clear Fail Counters - Control Byte #23 (17h)

- Description:** Resets the Lock Fail Counter and Integrator Fail Counter.
- Bytes to Follow:** 0 bytes
- SM Returns:** Operation Complete Byte # 255 (FFh)

Query Trace Names - Control Byte #24 (18h)

Description: Returns a list of all saved traces.

Bytes to Follow: 0 bytes

SM Returns: 2 + 41 x number of save traces
1-2) # of save traces
for each trace:
1-2) Trace Index
3) Measurement Mode (refer to Control Byte #3)
4-21) Date/Time in string format ("MM/DD/YYYYHH:MM:SS")
22-25) Date/Time as Unsigned Long Integer
26-41) Trace Name(16 bytes)

Delete Sweep Trace - Control Byte #25 (19h)

Description: Delete single or all stored sweep traces in Site Master.

Bytes to Follow: 1 byte
0 - Delete all traces
X - Delete single trace # X

SM Returns: Operation Complete Byte # 255 (FFh)

Upload Sweep Trace — Control Byte #26 (1Ah)

Description: Uploads a sweep trace to the Site Master.

Bytes to Follow: 735,1255, 2287, or 4351 Bytes (depending on resolution)
1-2)# of following bytes
3) Measurement Mode¹
4-7)Time/Date(in long integer)(seconds since Jan. 1, 1970)
8-17) Date in String Format(mm/dd/yyyy)
18-25) Time in String Format(hh:mm:ss)
26-41) Reference number stamp(16 bytes in ASCII)
42-43) # data points
44) Start Frequency (in KHz) (highest byte)
45) Start Frequency
46) Start Frequency
47) Start Frequency (lowest byte)
48) Stop Frequency (in KHz) (highest byte)
49) Stop Frequency
50) Stop Frequency
51) Stop Frequency (lowest byte)
52) Minimum Frequency Step Size(in KHz) (Highest byte)
53) Minimum Frequency Step Size
54) Minimum Frequency Step Size
55) Minimum Frequency Step Size (lowest byte)
56) Scale Top (highest byte)²
57) Scale Top
58) Scale Top
59) Scale Top (lowest byte)

- 60) ScaleBottom (higher byte) ²
- 61) Scale Bottom
- 62) Scale Bottom
- 63) Scale Bottom (lowest byte)
- 64) Frequency Marker 1 (higher byte) ³
- 65) Frequency Marker 1 (lower byte)
- 66) Frequency Marker 2 (higher byte) ³
- 67) Frequency Marker 2 (lower byte)
- 68) Frequency Marker 3 (higher byte) ³
- 69) Frequency Marker 3 (lower byte)
- 70) Frequency Marker 4 (higher byte) ³
- 71) Frequency Marker 4 (lower byte)
- 72) Frequency Marker 5 (higher byte) ³
- 73) Frequency Marker 5 (lower byte)
- 74) Frequency Marker 6 (higher byte) ³
- 75) Frequency Marker 6 (lower byte)
- 76) Single Limit Line value (highest byte) ²
- 77) Single Limit Line value
- 78) Single Limit Line value
- 79) Single Limit Line value (lowest byte)
- 80) Multiple Limit Segment # (1)
- 81) Multiple Limit Segment Status
- 82) Multiple Limit Segment Start X (in KHz)(highest byte)
- 83) Multiple Limit Segment Start X
- 84) Multiple Limit Segment Start X
- 85) Multiple Limit Segment Start X (lowest byte)
- 86) Multiple Limit Segment Start Y (higher byte)²
- 87) Multiple Limit Segment Start Y (lower byte)
- 88) Multiple Limit Segment End X (in KHz)(highest byte)
- 89) Multiple Limit Segment End X
- 90) Multiple Limit Segment End X
- 91) Multiple Limit Segment End X (lowest byte)
- 92) Multiple Limit Segment End Y (higher byte)²
- 93) Multiple Limit Segment End Y (lower byte)
- 94–149) Repeat bytes 80-93 for segments 2-5
- 150) Start Distance (highest byte) ⁴
- 151) Start Distance
- 152) Start Distance
- 153) Start Distance (lowest byte)
- 154) Stop Distance (highest byte) ⁴
- 155) Stop Distance
- 156) Stop Distance
- 157) Stop Distance (lowest byte)
- 158) Distance Marker 1 (higher byte) ⁵
- 159) Distance Marker 1 (lower byte)
- 160) Distance Marker 2 (higher byte) ⁵
- 161) Distance Marker 2 (lower byte)
- 162) Distance Marker 3 (higher byte) ⁵
- 163) Distance Marker 3 (lower byte)
- 164) Distance Marker 4 (higher byte) ⁵
- 165) Distance Marker 4 (lower byte)
- 166) Distance Marker 5 (higher byte) ⁵

- 167) Distance Marker 5 (lower byte)
- 168) Distance Marker 6 (higher byte) ⁵
- 169) Distance Marker 6 (lower byte)
- 170) Relative Propagation Velocity (highest byte) ⁶
- 171) Relative Propagation Velocity
- 172) Relative Propagation Velocity
- 173) Relative Propagation Velocity (lowest byte)
- 174) Cable Loss (highest byte) ⁷
- 175) Cable Loss
- 176) Cable Loss
- 177) Cable Loss (lowest byte)
- 178) Status Byte 1: (0b = Off , 1b = On)
 - (LSB) bit 0: Marker 1 On/Off
 - bit 1: Marker 2 On/Off
 - bit 2: Marker 3 On/Off
 - bit 3: Marker 4 On/Off
 - bit 4: Marker 5 On/Off
 - bit 5: Marker 6 On/Off
 - bit 6-7: Not Used
- 179) Status Byte 2: (0b = Off, 1b = On)
 - (LSB) bit 0: Marker 2 Delta On/Off
 - bit 1: Marker 3 Delta On/Off
 - bit 2: Marker 4 Delta On/Off
 - bit 3-7: Not Used
- 180) Status Byte 3: (0b = Off , 1b = On)
 - (LSB) bit 0: Single Limit On/Off
 - bit 1: CW mode On/Off
 - bit 2-3: Not Used
 - bit 4: Media (0=COAX, 1=WAVEGUIDE)
 - bit 5: Cal On/Off
 - bit 6: Limit Type (0b = Single; 1b = multiple)
 - bit 7: Unit of measurement (1b = Metric, 0b = English)
- 181) Status Byte 4:
 - (LSB) bit 0 - 1: DTF Windowing Mode
 - bit: 1 0
 - | |
 - 0 0 - Rectangular (No Windowing)
 - 0 1 - Nominal Side Lobe
 - 1 0 - Low Side Lobe
 - 1 1 - Minimum Side Lobe
 - bit 2 – 7: Not Used
- 182) Waveguide Loss (highest byte) ⁷
- 183) Waveguide Loss
- 184) Waveguide Loss
- 185) Waveguide Loss (lowest byte)
- 186) Waveguide Cutoff Freq (in KHz)(highest byte)
- 187) Waveguide Cutoff Freq
- 188) Waveguide Cutoff Freq
- 189) Waveguide Cutoff Freq (lowest byte)
- 190-215) Reserved Bytes (26 bytes)
- 216- 479) Sweep Data (33 points * 8 bytes/point= 264 bytes)
- 216- 559) Sweep Data (43 points * 8 bytes/point= 344 bytes)

216- 735) Sweep Data (65 points * 8 bytes/point= 520 bytes)
 216-1255) Sweep Data (130 points * 8 bytes/point= 1040 bytes)
 216-2287) Sweep Data (259 points * 8 bytes/point= 2072 bytes)
 216-4351) Sweep Data (517 points * 8 bytes/point= 4136 bytes)

8 bytes for each data point

1. Gamma MSB
2. Gamma
3. Gamma
4. Gamma LSB
5. Phase MSB
6. Phase
7. Phase
8. Phase LSB

SM Returns: 255 (FFh) Operation Complete Byte
 224 (E0h) Parameter Error: Not enough bytes transferred
 225 (E1h) Memory Error: Not enough memory in SM to store
 238 (EEh) Time-out Error

Notes: return loss = $-20 \cdot \log(\text{Gamma})$
 VSWR = $(1+\text{Gamma})/(1-\text{Gamma})$
 Phase compares the reflected to the incident (reference)

1. 00h: RL Frequency
 01h: SWR Frequency
 02h: Cable Loss Frequency
 10h: RL Distance
 11h: SWR Distance
 40h: Power Monitor
 74h: Fast Tune RL
 75h: Fast Tune SWR
2. "value" sent as (value * 1,000)
3. Display/Data Point
 To convert from "point" to frequency:

$$(((\text{stop frequency} - \text{start frequency}) / (\#\text{data points}-1)) * \text{point}) + \text{start frequency}$$
 where start frequency is stored in bytes 57-60, stop frequency is stored in 61-64 and #data points is stored in bytes 55-56
4. Distance data uses units 1/100,000m (or feet)
5. Display/ Data Point
 To convert from "point" to distance:

$$(((\text{stop distance} - \text{start distance}) / (\#\text{data points}-1)) * \text{point}) + \text{start distance}$$
 where start frequency is stored in bytes 163-166, stop frequency is stored in 167-170 and #data points is stored in bytes 55-56
6. Relative Propagation Velocity uses units 1/100,000
7. Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

Query Sweep Memory - Control Byte #27 (1Bh)

Description: Queries SM for percentage of memory that is available for trace storage.

Bytes to Follow: 0 Bytes

SM Returns: 1 byte - % of memory currently used (0 to 100)

Select Printer Type - Control Byte #30 (1Eh)

Description: Select Printer Type

Bytes to Follow: 1 byte

Printer ID

- 0 – Epson Stylus Models
- 1 – Epson LQ Models
- 2 – Citizen PN Models
- 3 – NEC Superscript Models
- 4 – NEC Silentwriter Models
- 5 – Seiko DPU 411, 414 Models
- 6 – Canon BJC 50
- 7 – Canon BJC 80
- 8 – Canon BJC 250
- 9 – Canon BJC 4400
- 10 – HP DJ 340, 350
- 11 – HP DJ 400 Series
- 12 – HP DJ 500 Series
- 13 – HP DJ 600 Series
- 14 – HP DJ 800 Series
- 15 – HP DJ 1120
- 16 – HP LJ 6L, 6P, 4000
- 17 – Epson Esc/P Compatible
- 18 – Epson Esc/P2 Compatible
- 19 – Epson Esc/P Raster Compatible
- 20 – HP PCL3 Compatible

SM Returns: Operation Complete Byte # 255 (FFh)

Select DTF Windowing - Control Byte #31 (1Fh)

Description: Select DTF Windowing Methods.

DTF windowing allows you to make a trade off between side lobe height and resolution.

Bytes to Follow: 1 byte

- 00h - Rectangular (finest resolution, highest side lobes)
- 01h - Nominal Side Lobe (balance between resolution and side lobes)
- 02h - Low Side Lobe
- 03h - Minimum Side Lobe

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid DTF Windowing Method
238 (EEh) Time-out Error

Set Trace Math - Control Byte #32 (20h)

Description: Setup trace math operation and trace.

Bytes to Follow: 2 bytes

- 1) Trace Math Operation (0 to 2)
 - 00h = Off
 - 01h = Subtraction
 - 02h = Addition
- 2) Trace on which to Perform Math Operation on (1 to 200)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid Trace Math Operation
238 (EEh) Time-out Error

Set Trace Overlay - Control Byte #34 (22h)

Description: Setup trace overlay operation and trace.

Bytes to Follow: 2 bytes

- 1) Trace Overlay Operation (0 to 1)
 - 00h = Off
 - 01h = On
- 2) Trace to Perform Overlay Operation on (1 to 200)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid Trace Overlay Operation
238 (EEh) Time-out Error

Get Options - Control Byte #37 (25h)

Description: Queries the options installed on the Site Master, returns a list as an ASCII string.

Bytes to Follow: 0 bytes

SM Returns: 2-4 bytes, depending on the options
Possible Option is "5" for Power Monitor.
If NO options are installed: "None"

Query Power Level - Control Byte #39 (27h)

Description: Return Power Level at detector Port

This control byte contains all the information you need to determine just about anything about a power monitor measurement.

Bytes to Follow: 0 bytes

SM Returns: 21 bytes (0b = Off, 1b = On)

- 1) Status Byte
 - (LSB) bit 0: Unit (0b - Watt/%, 1b - dBm/dBr)
 - bit 2: Relative Mode On/Off
 - bit 3: Offset Mode On/Off

- bit 4: Zero Mode On/Off
- bit 5- 7: Not Used
- 2 - 5) Relative Mode reference Power Level in dBm
- 6 - 9) Offset Mode Offset in dB
- 10 -13) Zero Mode Power Level in dBm
- 14 -17) Absolute Power Level in dBm
- 18 - 21) Power in dBm or dBr

Notes:

1. You can query power level without setting power monitor mode ON.
2. Absolute Power of -100 indicates a hardware failure (power monitor mode unavailable or RF detector not connected).
3. Power is returned in two's complement signed format, and is 1000 times the dBm value. Power levels are sent back as signed values. To get their correct decimal values, users must take the two's complement of them.
 For example, let's say the absolute power level is measured at -50 dBm. This will be sent by the unit as -50,000 decimal (remember, the values are sent as thousandths of dBm). The equivalent four hexadecimal bytes are FF, FF, 3C, B0 (FFFF 3CB0). The user must first take the logical inverse of this (the "not" of each of the bits; if the bit is a 1, it becomes a 0 and vice-versa). The result will be 0000 C34F. Now the user must add 1. The result will be 0000 C350. The equivalent decimal value is (50,000). Now add the negative sign since the first bit in the original number (FFFF3CB0) was a "1" ("F" in binary form is "1111"). Now we have -50,000. Finally, since the power levels are sent as thousandths of dBm, divide by 1000. The result is -50.
4. Relative power is in 1000th of dBr.
5. Offset is in 1000th of dB.

Set Power Monitor Unit - Control Byte #40 (28h)

- Description:** Set Power Monitor unit to watts or dBm.
- Bytes to Follow:** 1 byte
 00h = Watt (% if in relative mode)
 01h = dBm (dBr if in relative mode)
- SM Returns:** 255 (FFh) Operation Complete Byte
 224 (E0h) Parameter Error: Invalid power monitor unit
 238 (EEh) Time-out Error

Relative Mode On/Off - Control Byte #41 (29h)

- Description:** Enable or disable Power Monitor Relative Mode
- Bytes to Follow:** 1 byte
 00h = Off
 01h = On w/ trigger (use the current power level as a reference power level)
- SM Returns:** 255 (FFh) Operation Complete Byte
 224 (E0h) Parameter Error: Invalid parameter
 238 (EEh) Time-out Error

Offset Mode On/Off - Control Byte #42 (2Ah)

Description: Enable or disable Power Monitor Offset Mode

Bytes to Follow: 5 byte
1) On/Off (01h = On, 00h = Off)
2 - 5) Offset Power Level in dB

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid parameter
238 (EEh) Time-out Error

Notes:

1. If you turn the Offset mode off, you must still send the other bytes. Bytes 2 - 5 will be ignored.
-

Zero Mode On/Off - Control Byte #43 (2Bh)

Description: Enable or disable Power Monitor Zeroing Mode.

Bytes to Follow: 1 byte
00h = Off
01h = On with trigger (current power level is referenced as -80 dBm)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid state
238 (EEh) Time-out Error

Trigger Sweep - Control Byte #48 (30h)

Description: Causes the Site Master to perform a sweep if it is in single sweep or serial port echo mode.

Bytes to Follow: 0 bytes

SM Returns: Sweep Complete Byte # 192 (C0h)

Notes:

1. If the Site Master is not in single sweep or serial port echo mode, this byte does nothing.
 2. This command is for local mode operation. If the Site Master is in remote mode, sending the byte does nothing.
-

Check Battery Status - Control Byte #50 (32h)

Description: Return Smart Battery status.

Bytes to Follow: 0 bytes

SM Returns: 17 bytes
1-2) Battery Status flags (Refer to Smart Battery Data Spec 5.1.2.1)
3-4) State of Charge (unsigned integer 0 to 100(%) Full)
5-6) Battery Voltage (unsigned integer 0 to 65535 in mV)
7-8) Battery Current (signed integer -32,768 to +32,768 mA, positive = Charging)
9-10) Battery Avg current (signed integer -32,768 to +32,768 mA, positive = charging)
11-12) Average Time to Empty (unsigned integer 0 to 65535 minute)
13-14) Battery Charge Cycle Count (unsigned integer 0 to 65535 cycles)

- 15-16) Battery Capacity at Full Charge in mA hours (unsigned integer 0 to 65535 cycles)
 - 17) Unit Under Battery Power (01h = YES; 00h = NO)
-

Set Marker to Peak - Control Byte #51 (33h)

Description: Obtains Marker status information for peak value in the current trace. The value of the byte for marker number should be the marker number -1. For example, to set marker 1 to peak, send command number 51 followed by 0.

The return value is a display point. To calculate the corresponding frequency (or distance): $\text{Marker Frequency} = (\text{resolution} - 1) * (\text{marker freq} - \text{start freq})$.

Bytes to Follow: 1 byte
1) Marker Number (00h - 03h)

SM Returns: 2 bytes
1) Marker Position at Peak (highest byte)
2) Marker Position at Peak (lowest byte)

Set Marker to Valley - Control Byte #52 (34h)

Description: Obtains Marker status information for valley value in the current trace. The value of the byte for marker number should be the marker number -1. For example, to set marker 1 to valley, send command number 52 followed by 0.

The return value is a display point. To calculate the corresponding frequency (or distance): $\text{Marker Frequency} = (\text{resolution} - 1) * (\text{marker freq} - \text{start freq})$

Bytes to Follow: 1 byte
1) Marker Number (00h - 03h)

SM Returns: 2 bytes
1) Marker Position at Valley (highest byte)
2) Marker Position at Valley (lowest byte)

Set Site Master Single Limit - Control Byte #55 (37h)

Description: Sets the position and On/Off Status of the Limit Lines.

S8X0C supports Single Limit Line. The Control Byte will set the limit status and the limit value for current measurement mode.

See control byte #20 (14h) response byte 32 to 35 (1Ch to 9Ah) for current Site Master limit location and byte #136 for current single limit status.

Bytes to Follow: 3 bytes:
1) Limit Status (01h = ON; 00h = Off)
2) Limit Y (highest byte)
3) Limit Y (lowest byte)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid limit segment, limit status, or limit value
238 (EEh) Time-out Error

Notes: Limit Value depends on the current display mode selected.

Return Loss & Cable Loss:
Limit is in thousandths of a dB
Maximum value sent is 54000 which represents 54.00 dB
Minimum value sent is 0 which represents 0.0 dB

SWR:
Limit is in thousandths (of ratio)
Maximum value sent is 65530 which represents 65.53
Minimum value sent is 1000 which represents 1.00.

Automatically Save Runtime Setup - Control Byte #64 (40h)

Description: Automatically save the runtime setup when exiting remote mode. This flag must be set once per power cycle of the Site Master. It returns to its default value when the unit is turned off. The default value is (0), DO NOT automatically save the runtime setup.

Bytes to Follow: 1 byte
1) Save Runtime Setup On/Off
00h = Off (default)
01h = On

SM Returns: 255 (FFh) Operation Complete
238 (EEh) Time Out Error

Enter Remote Mode - Control Byte #69 (45h)

Description: Enter remote mode then send model number and firmware version to the computer

Bytes to Follow: 0 bytes

SM Returns: 13 bytes
1-2) Model # (0Eh for the S810C and 0Fh for the S820C)
3-9) Extended Model # (7 bytes in ASCII)
10-13) Software Version (4 bytes in ASCII)

The computer sends Enter Remote mode byte #69 (45h) to the Site Master and waits for a response.

Since the Site Master polls its serial port buffer at the end of each sweep, the computer must wait until the Site Master sends the return bytes before sending a new control byte. Otherwise, the new control byte overwrites the old one (saying enter remote) and the Site Master does not respond as expected.

Once in remote mode, the Site Master stops sweeping and a Remote Mode Indicator appears on the LCD.

The Site Master sends its model and software version numbers to the computer. The Site Master is now able to take multiple control bytes. It waits for the next control byte.

Enter Remote Mode Immediately - Control Byte #70 (46h)

Description: Enter remote mode in the middle of a sweep, then send the model number and firmware version to the computer.

Bytes to Follow: 0 bytes

SM Returns: 13 bytes
1-2) Model # (0Eh for the S810C and 0Fh for the S820C)
3-9) Extended Model # (7 bytes in ASCII)
10-13) Software Version (4 bytes in ASCII)

The computer sends Enter Remote Mode Immediately byte #70 (46h) to the Site Master and waits for a response. This control byte causes the unit to enter remote mode immediately. Note that this could result in incomplete sweep data. Use control byte #69 if complete data is required.

Once in remote mode, the Site Master stops sweeping. A Remote Mode Indicator appears on the LCD.

The Site Master sends its model and software version numbers to the computer. The Site Master is now able to take multiple control bytes. It waits for the next control byte.

Write Custom Cable - Control Byte #80 (50h)

Description: Write a cable parameter in the custom cable list.

Bytes to Follow: 25 bytes
1) Not Used
2) Cable List index (0 - 24)
3-17) Cable Description (string)
18) Propagation Velocity (highest byte)¹
19) Propagation Velocity
20) Propagation Velocity
21) Propagation Velocity (lowest byte)
22) Insertion Loss (highest byte)²
23) Insertion Loss
24) Insertion Loss
25) Insertion Loss (lowest byte)

SM Returns: 255 (FFh) Operation Complete
224 (E0h) Parameter Error
238 (EEh) Time Out Error

Notes:

1. Relative Propagation Velocity uses units 1/100,000
2. Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

Recall Custom Cable - Control Byte #81 (51h)

Description: Query a cable in the custom cable list.

Bytes to Follow: 2 byte
1) Not Used
1) Cable list index (0-24)

SM Returns: 24 bytes
1) Upper bound of Custom Cable Index
2 – 16) Cable Description (string)
17) Propagation Velocity (highest byte)¹
18) Propagation Velocity
19) Propagation Velocity
20) Propagation Velocity (lowest byte)
21) Insertion Loss (highest byte)²
22) Insertion Loss
23) Insertion Loss
24) Insertion Loss (lowest byte)

Notes:

1. Relative Propagation Velocity uses units 1/100,000
2. Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

Set Site Master Marker(Peak/Valley) - Control Byte #129 (81h)

Description: Sets an individual marker in current measurement mode.

The Site Master sets the position of a marker by its relative position on the graph. The lowest position is 0 at the start frequency (or distance). The highest position is at the stop frequency (or distance). For example, if the resolution is 130 Data Points, the start frequency is at point 0 and the stop frequency is at point 129. To calculate the data point form a frequency(or distance) do the following:

$$\text{Point} = \frac{(\text{resolution} - 1) * (\text{marker frequency} - \text{start frequency})}{(\text{stop frequency}) - (\text{start frequency})}$$

The On/Off Status of a Marker can be toggled using this control byte.

Bytes to Follow: 2 bytes
1) Marker Number (01h = marker 1, 02h = marker 2, 03h = marker 3, 04h = marker 4, 05h = marker 5, 06h = marker 6)
2) Marker Search Type (Peak=01h , Valley = 00h)

SM Returns: OK: 3 bytes
1) Marker Position (higher byte)
2) Marker Position (lower byte)
3) 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid marker, marker status, or marker position
238 (EEh) Time-out Error

Set SOSL Cal Parameter – Control Byte #130 (82h)

Description: Set the waveguide parameters

Bytes to Follow: 12 bytes

- 1) Waveguide 1/8th Offset Length (highest byte)¹
- 2) Waveguide 1/8th Offset Length
- 3) Waveguide 1/8th Offset Length
- 4) Waveguide 1/8th Offset Length (lowest byte)
- 5) Waveguide 3/8th Offset Length (highest byte) ¹
- 6) Waveguide 3/8th Offset Length
- 7) Waveguide 3/8th Offset Length
- 8) Waveguide 3/8th Offset Length (lowest byte)
- 9) Waveguide Cutoff Frequency (in KHz)(highest byte)
- 10) Waveguide Cutoff Frequency
- 11) Waveguide Cutoff Frequency
- 12) Waveguide Cutoff Frequency (lowest byte)

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid setting
238 (EEh) Time-out Error

Notes:

1. Offset Length uses 1/1000,000 mm
-

Set OSL Cal Parameter – Control Byte #131 (83h)

Description: Set the type of connector being used

Bytes to Follow: 1 byte

Byte sent 00h Connector type: K Male.
Byte sent 01h Connector type: K Female.
Byte sent 02h Connector type: N Male.
Byte sent 03h Connector type: N Female
Byte sent 04h Connector type: User Defined

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid setting
238 (EEh) Time-out Error

Write Custom Waveguide - Control Byte #133 (85h)

Description: Write a waveguide parameter in the custom waveguide list.

Bytes to Follow: 25 bytes

- 1) Not Used
- 2) WG List index (0 - 24)
- 3 – 17) WG Description (in ASCII)
- 18) WG Cutoff Frequency (in KHz) (highest byte)
- 19) WG Cutoff Frequency
- 20) WG Cutoff Frequency
- 21) WG Cutoff Frequency (lowest byte)
- 22) WG Loss (highest byte)¹

- 23) WG Loss
- 24) WG Loss (lowest byte)

SM Returns: 255 (FFh) Operation Complete
 224 (E0h) Parameter Error: Invalid Save Location.
 238 (EEh) Time Out Error

Notes:

- 1. Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

Recall Custom Waveguide - Control Byte #134 (86h)

Description: Query a waveguide in the custom waveguide list.

Bytes to Follow: 2 byte
 1) Not Used
 2) WG list index (0-24)

SM Returns: 24 bytes
 1) Upper Bound of Custom WG Index
 2 – 16) WG Description (in ASCII)
 17) WG Cutoff Frequency (in KHz)(highest byte)
 18) WG Cutoff Frequency
 19) WG Cutoff Frequency
 20) WG Cutoff Frequency (lowest byte)
 21) WG Loss (highest byte)¹
 22) WG Loss
 23) WG Loss
 24) WG Loss (lowest byte)

Notes:

- 1. Loss uses units 1/100,000 dB/m or 1/100,000 dB/ft.

Query User Connector_Coefficient - Control Byte #135 (87h)

Description: Query the user specified coefficients for the coax port connector.

Bytes to Follow: 0 bytes

SM Returns: 24 bytes
 1) Port Connector Offset Open Length(highest byte)¹
 2) Port Connector Offset Open Length
 3) Port Connector Offset Open Length
 4) Port Connector Offset Open Length(lowest byte)
 5) Port Connector Offset Short Length(highest byte) ¹
 6) Port Connector Offset Short Length
 7) Port Connector Offset Short Length
 8) Port Connector Offset Short length(lowest byte)
 9) Port Connector Capacitive Coefficient c0(highest byte) ²
 10) Port Connector Capacitive Coefficient c0
 11) Port Connector Capacitive Coefficient c0
 12) Port Connector Capacitive Coefficient c0 (lowest byte)
 13) Port Connector Capacitive Coefficient c1(highest byte) ²
 14) Port Connector Capacitive Coefficient c1

- 15) Port Connector Capacitive Coefficient c1
- 16) Port Connector Capacitive Coefficient c1 (lowest byte)
- 17) Port Connector Capacitive Coefficient c2(highest byte) ²
- 18) Port Connector Capacitive Coefficient c2
- 19) Port Connector Capacitive Coefficient c2
- 20) Port Connector Capacitive Coefficient c2 (lowest byte)
- 21) Port Connector Capacitive Coefficient c3(highest byte) ²
- 22) Port Connector Capacitive Coefficient c3
- 23) Port Connector Capacitive Coefficient c3
- 24) Port Connector Capacitive Coefficient c3 (lowest byte)

Notes:

- 1. Offset Length uses units 1/1000,000 mm
- 2. ((Value Desired / factor) * 1000) + 1000000
 where
 factor = 10⁻¹⁵ for c0
 10⁻²⁷ for c1
 10⁻³⁶ for c2
 10⁻⁴⁵ for c3

Set User Connector Coefficient - Control Byte #136 (88h)

Description: Set the user specified coefficients for the coax port connector.

Bytes to Follow: 24 byte

- 1) Port Connector Offset Open Length(highest byte)¹
- 2) Port Connector Offset Open Length
- 3) Port Connector Offset Open Length
- 4) Port Connector Offset Open Length(lowest byte)
- 5) Port Connector Offset Short Length(highest byte) ¹
- 6) Port Connector Offset Short Length
- 7) Port Connector Offset Short Length
- 8) Port Connector Offset Short Length(lowest byte)
- 9) Port Connector Capacitive Coefficient c0(highest byte) ²
- 10) Port Connector Capacitive Coefficient c0
- 11) Port Connector Capacitive Coefficient c0
- 12) Port Connector Capacitive Coefficient c0 (lowest byte)
- 13) Port Connector Capacitive Coefficient c1(highest byte) ²
- 14) Port Connector Capacitive Coefficient c1
- 15) Port Connector Capacitive Coefficient c1
- 16) Port Connector Capacitive Coefficient c1 (lowest byte)
- 17) Port Connector Capacitive Coefficient c2(highest byte) ²
- 18) Port Connector Capacitive Coefficient c2
- 19) Port Connector Capacitive Coefficient c2
- 20) Port Connector Capacitive Coefficient c2 (lowest byte)
- 21) Port Connector Capacitive Coefficient c3(highest byte) ²
- 22) Port Connector Capacitive Coefficient c3
- 23) Port Connector Capacitive Coefficient c3
- 24) Port Connector Capacitive Coefficient c3 (lowest byte)

SM Returns: 255 (FFh) Operation Complete Byte
 224 (E0h) Parameter Error
 238 (EEh) Time-out Error

Notes:

1. Offset Length uses units 1/1000,000 mm
2. $((\text{Value Desired} / \text{factor}) * 1000) + 1000000$
where
factor = 10^{-15} for c0
 10^{-27} for c1
 10^{-36} for c2
 10^{-45} for c3

Set Baud Rate - Control Byte #197 (C5h)

Description: Sets the Baud Rate for serial communications.

Bytes to Follow: 1 byte
1) Baud rate index: 0 = 9600
1 = 19200
2 = 38400
3 = 56000
4 = 115200

SM Returns: 255 (FFh) Operation Complete
224 (E0h) Parameter Error: Invalid Baud Rate
238 (EEh) Time Out Error

Set Language – Control Byte #198 (C6h)

Description: Set Default language mode

Bytes to Follow: 1 byte
1) 00h = English
01h = French
02h = German
03h = Spanish
04h = Chinese
05h = Japanese

SM Returns: 255 (FFh) Operation Complete Byte
224 (E0h) Parameter Error: Invalid Language
238 (EEh) Time-out Error

Query Time - Control Byte #208 (D0h)

Description: Queries the Site Master for the current time in ASCII format.

SM Returns: 8 bytes HH:MM:SS
1) Hour (higher byte)
2) Hour (lower byte)
3) :
4) Minute (higher byte)
5) Minute (lower byte)
6) :
7) Second (higher byte)
8) Second (lower byte)

Read ASCII Serial Number - Control Byte #225 (E1h)

Description: Sets the SM into Keypad test mode.

Bytes to Follow: 1 byte
1) Serial number storage location (1=main serial, 2=secondary)

SM Returns: 8 bytes
1-8) Serial Number, in ASCII

Exit remote mode - Control Byte #255 (FFh)

Description: Site Master exits remote mode

Bytes to Follow: 0 byte

SM Returns: 1 byte
1) Confirm flag FFh

The computer sends a serial stop byte #255 (FFh) to the Site Master. Site Master returns a confirm flag (FFh). The Site Master resumes sweeping, either continuously or singly.

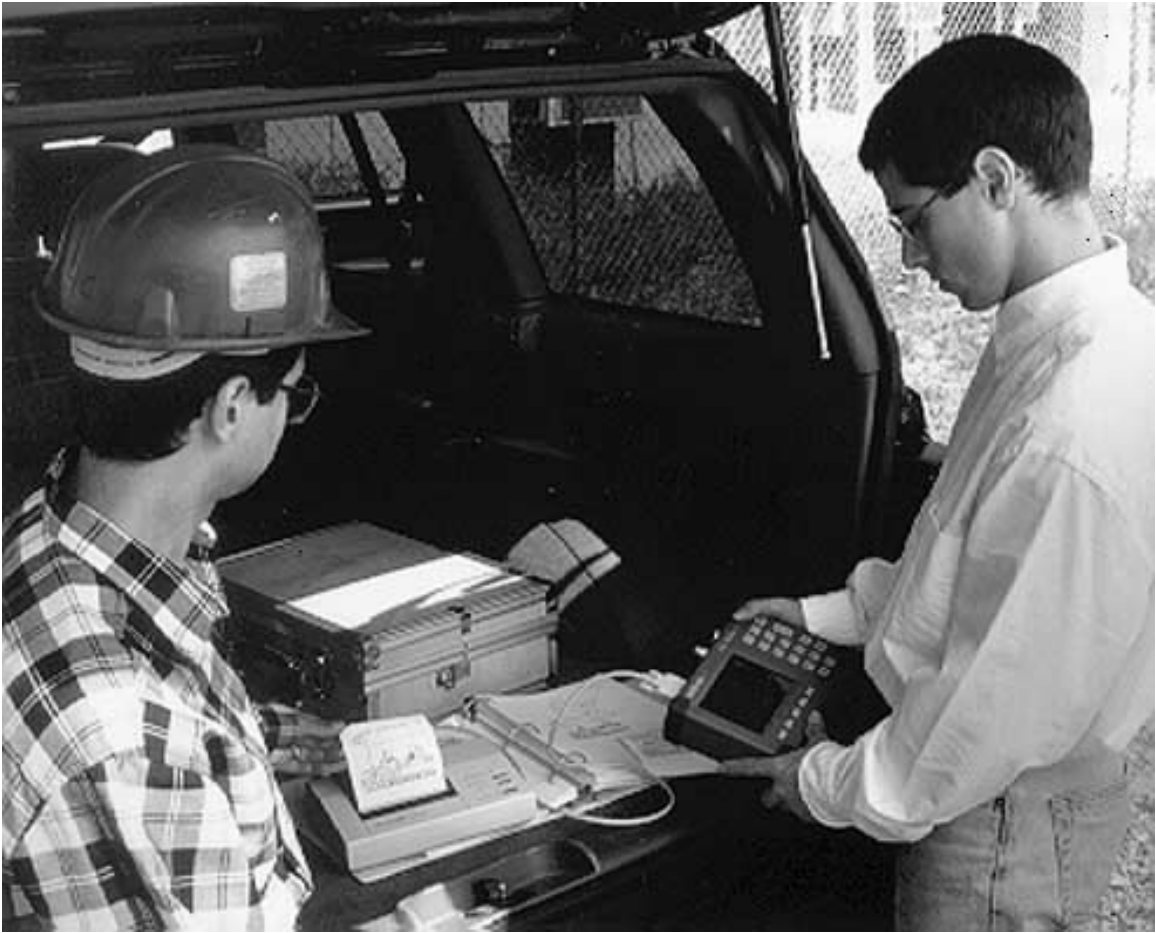
You may also press the "ESCAPE" key on the Site Master key pad to exit from remote mode (given that the serial communication is still in sync). In this case, the Site Master does not return a confirm byte to the serial port.

When exiting remote mode, system parameters changed during remote mode are used immediately.

If the user turns on the automatic save mechanism (control byte #64), the changes are automatically written to the runtime setup (setup 0).

Parameter Definitions

Parameter	# of bytes	Step	Example / Description
Frequency	4 bytes unsigned	1 KHz	5 Ghz = 5000000
Scale (RL, CL)	2 bytes unsigned	1 / 1000 dB	51.3 dB = 51300
(SWR)	2 bytes unsigned	1 / 1000 (ratio)	65.53 = 65530
Limit (RL, CL)	2 bytes unsigned	1 / 1000 dB	51.3 dB = 51300
(SWR)	2 bytes unsigned	1 / 1000 (ratio)	65.53 = 65530
(G/IL)	2 bytes unsigned	1 / 100 dB	100 dB = 0 120 dB = 22000
Markers (frequency & distance marker)	2 bytes unsigned	1 sweep point	Marker Values are given in relative position of the graph. The lowest value is 0, the highest is 129 (130 data points total).
Distance	4 bytes unsigned	1/100,000 m/ft	12.34 m = 1234000
Relative Propagation Velocity	4 bytes unsigned	1 / 100,000	0.837 = 83700
Cable Loss	4 bytes unsigned	1 / 100,000 dB	-0.345 dB/m = 34500
Gamma	4 bytes signed	1 / 1000 (ratio)	Gamma value is the ratio of magnitude of reflected signal over the magnitude of incident signal.
Phase	4 bytes signed	1 / 10 degree	Phase value is the difference in phase between the incident and reflected signal.
Power: dBm/dBr	4 bytes signed	1 / 1000 dBm 1 / 1000 dBr	51.3 dBm = 51300 10.4 dBr = 10400
Lock Fail Counter	2 bytes unsigned	1 error count	234 fails = 234
Integrator Fail Counter	2 bytes unsigned	1 error count	123 fails = 123
Waveguide Cutoff Frequency	4 bytes unsigned	1 KHz	5Ghz = 5000000
Waveguide Loss	4 bytes unsigned	1 / 100,000 dB	-0.345 dB/m = 34500
Port Connector Offset Open length	4 bytes unsigned	1/1000,000 mm	12650 = .012650m
Capacitive Coefficients	4 bytes unsigned		((Value Desired / factor) * 1000) + 1000000 where factor = 10 ⁻¹⁵ for c0 10 ⁻²⁷ for c1 10 ⁻³⁶ for c2 10 ⁻⁴⁵ for c3



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